WE CLAIM

A method of determining a mutagen comprising:

contacting a test compound with a host cell comprising a DNA sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and determining a mutagen when an amount of the fluorescent protein meets or exceeds a predetermined threshold value.

- 10 2. The method of claim 1, wherein the fluorescent protein comprises a green fluorescent protein.
 - 3. The method of claim 2, wherein the fluorescent protein comprises a variant green fluorescent protein.
 - 4. The method of claim 1, wherein the fluorescent protein comprises a variant fluorescent protein.
- 5. The method of claim 1, wherein the mutagen sensitive gene comprises an SOS gene.
 - 6. The method of claim 5, wherein the mutagen sensitive gene comprises a variant SOS gene.
 - 7. The method of claim 1, wherein the mutagen sensitive gene comprises a variant mutant sensitive gene.
 - 8. The method of claim 1, wherein contacting comprises diluting the host cell and incubating at 37 °C with shaking.

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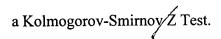
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- 9. The method of claim 1, wherein contacting comprises growing the host cell at logarithmic phase.
- 10. The method of claim 1, wherein contacting comprises growing the cell at stationary phase.
 - 11. The method of claim 1, wherein contacting comprises depleting a nutrient.
 - 12. The method of claim 11, wherein contacting comprises starving the host cell.
 - 13. The method of claim 1, wherein contacting comprises incubating host cell with a range of concentrations of the test compound.
 - 14. The method of claim 1, wherein monitoring comprises detecting fluorescence.
 - 15. The method of claim 14, wherein detecting fluorescence comprises employing a fluorescence detector reading samples in a 96-well microtiter plate.
 - 16. The method of claim 14, wherein detecting fluorescence comprises exciting at a wavelength comprising 485 nm and detecting emission at a wavelength comprising 510 nm, 520 nm, or a combination thereof.
 - 17. The method of claim 1, wherein determining comprises statistically analyzing the amount or distribution of green fluorescent protein.
 - 18. The method of claim 17, wherein statistically analyzing comprises analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.
- The method of claim 18, wherein statistically analyzing comprises conducting

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- 20. The method of claim 19, wherein a P value of less than about 0.05 determines presence of a mutagen.
- 21. The method of claim 1, wherein determining comprises comparing the amount of green fluorescent protein in a host cell contacted with a test compound to a host cell contacted with a control substance.
- 10 22. The method of claim 1, further comprising providing the host cell.
 - 23. The method of claim 22, wherein providing comprises growing the host cell to reach logarithmic phase and diluting the host cell.
- 15 24. The method of claim 22, wherein providing comprises growing the host cell to reach stationary phase.
 - 25. A method of determining a mutagen comprising:

 contacting a test compound with a host cell comprising a DNA sequence encoding a
 fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and statistically analyzing the amount or distribution of green fluorescent protein.

- 26. The method of claim 25, wherein statistically analyzing comprises analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.
- 27. A method of determining a mutagen comprising:

 contacting a test compound with a host cell comprising a DNA sequence encoding a

 fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and statistically analyzing the amount of green fluorescent protein by analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.

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- 28. A recombinant host cell comprising a DNA encoding a fluorescent protein operably linked to a mutagen sensitive gene.
- 29. The recombinant host cell of claim 28, comprising a DNA encoding a green fluorescent protein.
 - 30. The recombinant host cell of claim 28, wherein the mutagen sensitive gene comprises an SOS gene.
- 15 31. The recombinant host cell of claim 28, wherein the host cell comprises an E. coli, a Salmonella typhimurium, a yeast, or a mammalian cell.
 - 32. The recombinant host cell of claim 28, wherein the SOS gene comprises a umuDC operon.

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- 33. The recombinant host cell of claim 32, wherein the umuDC operon comprises bases 1 to 968 of an E. coli umuDC operon (SEQ ID NO:_____).
- 34. The recombinant host cell of claim 29, wherein the coding sequence for a green fluorescent protein comprises the coding sequence from A. victoria.
 - 35. The recombinant host cell of claim 34, wherein the coding sequence for a green fluorescent protein comprises the sequence of SEQID NO:_____.
 - 36. The recombinant host cell of claim 28, comprising plasmid pTJgfp.

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- 37. The recombinant host cell of claim 28, comprising a DNA sequence encoding a variant fluorescent protein.
- 38. The recombinant host cell of claim 28, wherein the mutagen sensitive gene comprises a variant mutagen sensitive gene.
 - 39. The recombinant host cell of claim 38, wherein the mutagen sensitive gene comprises a variant SOS gene.
- 40. A DNA construct comprising a mutagen sensitive gene operably linked to a coding sequence for a fluorescent protein.
- 41. The DNA of claim 40, wherein the mutagen sensitive gene comprises an SOS gene.
 - 42. The DNA of claim 41, wherein the SOS gene comprises a umuDC operon.
- 43. The DNA of claim 40, wherein the coding sequence for a fluorescent protein encodes a green fluorescent protein.
 - 44. An expression vector comprising the DNA of claim 40.
 - 45. A recombinant host cell comprising the DNA of claim 40.
 - 46. The DNA of claim 40, comprising a variant mutagen sensitive gene.
 - 47. The DNA of claim 40, comprising a coding sequence for a variant fluorescent protein.

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- 48. An expression vector comprising plasmid pSE117 and a coding sequence for a fluorescent protein.
- The expression vector of claim 48, comprising a coding sequence for a green fluorescent protein.
 - 50. The expression vector of claim 49, wherein the coding sequence for a green fluorescent protein replaces a sequence of the plasmid pSE117.
- 10 51. The expression vector of claim 49, wherein the coding sequence for a green fluorescent protein is ligated to a fragment from the plasmid pSE117 between a unique HindIII restriction site and a unique EcoR1 restriction site.
 - 52. The expression vector of claim 48, comprising plasmid pTJgfp.
 - 53. A recombinant host cell comprising the expression vector of claim 48.
 - 54. The expression vector of claim 48, comprising a coding sequence for a variant fluorescent protein.
 - 55. A polypeptide comprising an amino acid sequence of a UmuD protein, a UmuC protein, or a combination thereof and an amino acid sequence of a fluorescent protein.
 - 56. A method of determining an antimutagen comprising:
 contacting a test compound and a mutagen with a host cell comprising a DNA
 sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;
 monitoring a host cell preparation for the fluorescent protein; and
 determining a mutagen when an amount of the fluorescent protein falls below a
 predetermined threshold value.

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